

chamber which constitutes an enlargement of the channel.

The general arrangements will be clear from the diagrammatic sketch in the figure. C is the observation chamber, which is air-tight, and provided with a platform for carrying the observer and the necessary measuring appliances. B is the bell-mouthed air inlet, which is provided with a series of guide plates of honeycomb section on the delivery side to ensure that the air enters the chamber in parallel filaments. V is the outlet and suction fan. S is the model under test, connected to the weighing beam at A.

The advantages of this method as regards simplicity, comparative cheapness of construction, and convenience in making the observations are obvious, and in respect of its accuracy it is claimed that, using the results of M. Eiffel's earlier experiments on falling plates as data, a complete check has been afforded by the results obtained in the new apparatus. It may be doubted, however, if the accuracy of this method is so great as that obtained in a carefully designed parallel channel, for there can hardly fail to be a disturbance of the stream lines due to the sudden enlargement at the inlet similar to that observed in the flow of water. From a curve published in the article, it appears that plates as large as 90 cm. by 15 cm. have been used in a current drawn from an inlet 150 cm. in diameter. According to the writer's experience with this method, the apparent pressure for normal impingement of the current on a plate the area of which is the same fraction of that of the inlet as in the examples cited would be about 10 per cent. in excess of its true value, but in the case of small inclinations, which is, of course, relatively more important in aeronautical work, the error would be much smaller, and possibly of the same order of magnitude as those incurred in the estimations of the velocity of the current. In this branch of aeronautics valuable results may be expected from M. Eiffel's researches.

T. E. STANTON.

C. H. GREVILLE WILLIAMS, F.R.S.

CHARLES HANSON GREVILLE WILLIAMS was born at Cheltenham, September 22, 1829, the son of S. Hanson Williams, a solicitor; his death occurred on June 15, 1910. He commenced his professional career as first assistant to Prof. Anderson, of Glasgow University; after some years spent in research work he moved to Edinburgh, where he conducted a tutorial class under Dr. Lyon Playfair. From 1857 to 1859 he was lecturer on chemistry in the Normal College, Swansea. In 1859 he returned to Glasgow as chemist to the works of Messrs. Miller, chemical manufacturers. He migrated to Greenford Green in 1863, remaining with Messrs. Perkin until 1868. About that year he entered into partnership with M. Edouard Thomas, at the Star Chemical Works, Brentford, the firm being makers of coal-tar colours, and subsisting until 1877. Mr. Greville Williams about this time gave up his connection with manufacturing chemistry and became photometric supervisor to the Gas Light and Coke Company, with whom he remained until 1901, then retiring into the country, where he seldom saw his old friends and acquaintances, but was much interested in the study of the ancient Egyptian language and the translation of inscriptions. Until rheumatism disabled him he was an expert draughtsman and calligraphist, a fair game shot, and an enthusiastic angler. Although in reality a charming companion, with unusual conversational powers, and a keen appreciation of literary and artistic culture, Greville Williams possessed a very modest and retiring disposition, and

became, especially of late years, an almost complete recluse. He was more nervous about his state of health than he need have been, and, in consequence, cut himself off unnecessarily from scientific and social intercourse. This isolation was also due, no doubt, in part to his straitened circumstances, which necessitated strict economy and debarred him from the continuance of his scientific researches—hard lines for a thorough enthusiast; and such he was, possessed, moreover, with the true chemical instinct and a general scientific aptitude. It is a pity that the genius for investigation which was shown in his researches on isoprene, on beryl, and on the bases from bituminous shale, from the Boghead mineral, and from the destructive distillation of cinchonine, did not develop in accordance with more modern methods in his later years. But he made many interesting discoveries, and has left a considerable record of thoroughly sound work.

Greville Williams was elected F.R.S. in June, 1862. He outlived the rest of the distinguished "fifteen" of that year. It was in 1862 also that he joined the Chemical Society. He contributed a number of papers to the publications of these societies, as well as many notes to the *Chemical News*, and also wrote articles for Ure's Dictionary and for Watts's Dictionary, as well as for the *Journal of Gas Lighting*. His chief literary work was "A Handbook of Chemical Manipulation" (Van Voorst, 1857); a supplement appeared in 1879.

On November 25, 1852, Greville Williams married Henrietta Bosher; she died on February 16, 1904. One son and three daughters survive.

The writer of this notice has lost a friend of nearly sixty years' standing—a friend of rare quality and of high Christian character.

A. H. C.

NOTES.

We announce with deep regret the death, on Monday last at Milan, at the age of seventy-five years, of Prof. G. V. Schiaparelli, Foreign Member of the Royal Society.

THE death (on June 12) is announced of Dr. W. H. Seaman, professor of chemistry in Harvard University, at the age of seventy-three years.

We regret to announce the death, on July 4, of Mr. R. Russell, I.S.O., who was for thirty-six years connected with the administration of education in Natal. In 1877 he became Superintendent of Education, and retired in 1903.

At the general monthly meeting of the members of the Royal Institution, held on Monday last, it was announced that the King has consented to become Patron of the institution.

THE Janssen prize of the Paris Academy of Sciences has been awarded to Prof. W. W. Campbell, director of the Lick Observatory, University of California.

SIR J. J. THOMSON, F.R.S., has been elected president of the Junior Institution of Engineers, in succession to Sir H. J. Oram, K.C.B.

DR. F. A. BATHER, F.R.S., has been appointed by the trustees to represent the British Museum (Natural History) at the forthcoming International Geological Congress in Stockholm.

THE Cullen Victoria Jubilee prize has been awarded by the Royal College of Physicians of Edinburgh to Dr. R. W. Philip, for his work on tuberculosis. The prize is awarded once in every four years for the "most important contribution to practical medicine."

THE Journal of the American Medical Association states that a bronze relief portrait of Prof. W. Osler, F.R.S., has been placed in Osler Hall of the Medical and Chirurgical Faculty, Baltimore. It is an enlargement of the small one now in the Johns Hopkins Medical Library.

MR. C. O. WATERHOUSE, I.S.O., who for the period of forty-four years was in the service of the trustees of the British Museum, has just retired from the position of assistant-keeper in charge of the insect section of the Zoological Department of the Natural History Museum. To mark the occasion of his retirement, he was last week presented by many colleagues and friends with an illuminated address, a Sheraton bureau-bookcase, a gold watch, and an aneroid barometer.

PROF. ANGELO MOSSO asks us to announce that the Monte Rosa laboratories, which are equipped with all necessary scientific instruments, will re-open on July 15, and that the Royal Society has at its disposal nominations for two workers in botany, bacteriology, zoology, physiology, terrestrial physics or meteorology.

THE banquet to the five past-presidents of the Chemical Society (Prof. W. Odling, F.R.S., Sir Henry E. Roscoe, F.R.S., Sir William Crookes, F.R.S., Dr. Hugo Müller, F.R.S., and Dr. A. G. Vernon Harcourt, F.R.S.) who have attained their jubilee as fellows of the society is to take place at the Savoy Hotel on Friday, November 11 next. Applications for tickets must be made to the assistant secretary of the society by, at latest, November 4. It will be remembered that the banquet was postponed from May 26 in consequence of the death of the King.

A REUTER message from Catania states that a strong shock of earthquake was felt on Sunday morning in Sicily, at Giarre, Linguaglossa, and Zafferana. A slight shock was experienced at Mimeo.

THE twenty-first annual conference of the Museums Association was opened on Tuesday at York, when the president, Dr. Tempest Anderson, delivered an address on "Volcanoes and their Museum Treatment," and papers were read by Dr. F. A. Bather, F.R.S., Dr. Scharff, Dr. E. L. Gill, and Mr. L. E. Hope on, respectively, "Palæontology Exhibits at the Japan-British Exhibition," "Cleaning Bones by a Dry Sand Process," "A Method of Exhibiting Corals," "A Simple Way of Exhibiting the Reverse of Coins and Medals," and "The Natural History Records Bureau at the Carlisle Museum."

An exhibition of Hygiene was opened at Buenos Aires on July 3. The British section is reported to be small. It is divided into twenty-nine sub-sections, and contains specimens of surgical instruments, orthopaedic appliances, and drugs. The French section is incomplete. Italy exhibits numerous health foods. Chile furnishes exhaustive bacteriological laboratories, mainly for veterinary research. The Argentine Asistencia Publica displays first-aid and life-saving appliances, preventives, &c. The promised agricultural and railway exhibitions are expected to be opened this week.

THE fifth meeting of the International Congress of Mathematicians will take place at Cambridge in 1912. In connection with one of the sections of the congress, an International Commission on Mathematical Teaching has been constituted, which includes delegates appointed by the various Governments interested in the congress, and a series of national sub-commissions has been established to assist the International Commission. The President of the Board of Education has appointed

Sir George Greenhill, F.R.S., Prof. W. W. Hobson, F.R.S., and Mr. C. Godfrey to be the British delegates, and he has further appointed an advisory committee to assist the commission in the collection of reports and papers on the teaching of mathematics, and this committee, which is to act also as the British sub-committee, has been constituted as follows:—Mr. C. E. Ashford, Sir G. H. Darwin, F.R.S., Mr. C. Godfrey, Sir George Greenhill, F.R.S., Mr. G. H. Hardy, F.R.S., Prof. W. W. Hobson, F.R.S., Mr. C. S. Jackson, Sir Joseph Larmor, F.R.S., Prof. A. E. H. Love, F.R.S., and Prof. G. A. Gibson. Mr. C. S. Jackson is honorary secretary to the sub-committee.

THE programme of the joint summer meeting of the Institution of Mechanical Engineers and the American Society of Mechanical Engineers is now available. As has already been announced, the meeting will take place in Birmingham and London on July 26 to 30. The following papers are to be read and discussed:—In Birmingham: English running-shed practice, by Mr. C. W. Paget; engine-house practice, or the handling of locomotives at terminals to secure continuous operation, by Mr. F. H. Clark; handling locomotives at terminals, by Mr. F. M. Whyte; handling locomotives, by Mr. H. H. Vaughan; American locomotive terminals, by Mr. W. Forsyth; high-speed tools, and machines to fit them, by Mr. H. I. Brackenbury; tooth-gearing, by Mr. J. D. Steven; interchangeable involute gearing, a joint paper by Members of the Committee of the A.S.M.E. on standards for involute gears. In London: electrification of suburban railways, by Mr. F. W. Carter; cost of electrically-propelled suburban trains, by Mr. H. M. Hobart; economics of railway electrification, by Mr. W. B. Potter; electrification of trunk lines, by Mr. L. R. Pomeroy; electrification of railways, by Mr. G. Westinghouse.

IN connection with the summer meeting of the Association of Technical Institutions, the Mayor and Mayoress of Salford are to give a garden-party in Peel Park, Salford, and hold a reception in the Royal Museum and Art Galleries on Thursday, July 14.

THE sixty-ninth annual meeting of the Medico-psychological Association of Great Britain and Ireland will be held at the Royal College of Physicians, Edinburgh, on July 21 and 22, under the presidency of Dr. John Macpherson. Dr. C. H. Bond, 11 Chandos Street, Cavendish Square, W., is the honorary general secretary.

AN International Congress of Forensic Medicine will be held at Brussels on August 4 to 10. The programme will include psychological medicine, bacteriology, toxicology, and legislation in relation to legal medicine. Governments, academies of medicine, universities, and associations of chemists and toxicologists have been invited to send delegates. There will be an exhibition of apparatus and medical instruments in connection with the congress. The general secretary is Dr. C. Moreau, rue de la Gendarmerie, 6, Charleroi.

ACCORDING to the Journal of the Royal Society of Arts, the second International Congress on Industrial Diseases is to be held in Brussels on September 10 to 14 next. Among the questions to be discussed are:—Can industrial diseases be distinguished from accidents? What should be their distinctive characteristics? What medical equipment is provided in mines, factories, workshops, &c.? the present state of the problem of ankylostomiasis; the eye and eyesight in connection with industrial diseases; work in compressed air.

THE tenth International Geographical Congress is to be held in Rome on October 15 to 22, 1911. The congress will be divided into eight sections, and communications may be made in Italian, French, German, or English. Abstracts of papers proposed for presentation to the meeting must be sent in not later than April 30, 1911, and reports on subjects brought before previous congresses or suggested by the executive subcommittee must be received not later than August 31, 1911. The president of the congress is the Marquis Raffaele Cappelli, president of the Italian Geographical Society.

ACCORDING to *Science*, plans for the extension of the American Museum of Natural History are being prepared by the trustees. The present building, erected between 1874 and 1908, includes eight units, and the plans now in preparation contemplate an additional six units, completing the central hall, the east and west transepts, the east entrance pavilion, and the south-east façade.

A SOCIETY called the Christopher S. Ledentzoff Society for the Development of Experimental Sciences and their Practical Applications has been formed in connection with the Moscow Imperial Technical School, the objects of which are to assist discoveries and experiments in connection with natural science; to develop technical inventions and improvements; to investigate and apply to practical use any scientific or technical discovery or improvement. The society expresses the hope that its aims will attract the notice of all similar institutions and persons working in scientific and technical spheres, and appeals for assistance to all such institutions and persons for any support which might be given by (a) interchange of correspondence; (b) a supply of lists of privileges and patents, and reports on scientific and technical subjects. Further particulars as to the aims of the society may be obtained from the secretary, care of the Imperial Technical School, Moscow.

A GEOGRAPHICAL society, called the Servian Geographical Society, has been established at Belgrade. Its first president is Prof. J. Cvijic. The society proposes to begin the publication of a quarterly journal in January next.

THE Institute of Chemistry of Great Britain and Ireland gives notice of the following examinations :—in biological chemistry, bacteriology, fermentation and enzyme action, with special reference to the chemistry and bacteriology of food-stuffs, water-supply and sewage disposal, and the application of biological chemistry to industries and manufactures, beginning on Monday, October 17 next; in chemical technology in October next, the exact date to be announced later.

SPEAKING in the House of Commons on Wednesday of last week on the Colonial Office Vote, Colonel Seely, the Under-Secretary for the Colonies, referred to the subject of sleeping sickness, and the work that has been done or is in progress in combating it. Coincident with the coming of the white man there had been, he said, a spread of various diseases. The spread of sleeping sickness alone had been most remarkable and disastrous. How many persons had died they did not know, but that hundreds of thousands had died they did know. Tremendous efforts had been made by many countries, and he thought we might claim especially by this country, to remove this great scourge. Sir David Bruce went, with his wife, into the heart of the plague-stricken country, and spent many months there investigating this great scourge of sleeping sickness. Almost every person in the place where he lived was suffering in some degree from this sickness, and when he told the

House that, out of the hundreds of thousands of cases, they did not know of a single case of recovery, he thought they would realise to how great an extent those who tried to deal with the disease took their lives in their hands when they went out to these countries. He had mentioned Sir David Bruce, but there were many others. Some had already died in this great cause, and their names were, alas! already forgotten. But when the history of brave deeds came to be written, the deeds of those men who had gone into the heart of Africa to try to combat this insidious and most fatal of all diseases would not be forgotten, and would perhaps be considered as giving more striking proof of the ability of men to overcome natural fear than almost anything else in the annals of mankind. We now knew that these diseases were caused by flies, but the difficulty of finding a remedy was immense. It was thought that the removal of the natives from the infested areas might prove a remedy. Sleeping sickness was caused by the tsetse-fly, and it was thought that if the population could be removed from the shores of the lakes where alone that fly could live, they would be cured. Unfortunately, that had not proved to be entirely the case. But still we did know a great deal more than we did before about the origin and cause of sleeping sickness, and we had checked the mortality to a most remarkable degree.

DR. W. L. DUCKWORTH and Mr. W. J. Pocock contribute to vol. xiv. of the Cambridge Antiquarian Society's Proceedings for the current year a paper on a collection of human bones found in the course of excavations on the site of an Augustinian Friary near the Corn Market, Cambridge. Among these appear specimens of a tall, broad-headed race which may be assigned to the British Bronze-age type, to early Danish immigrants of the Borreby class, or to later arrivals from a southerly region, perhaps Normandy or Burgundy, these last being foreign ecclesiastics who founded the Cambridge Friary. After full discussion of the question, Dr. Duckworth favours the last explanation. An excavation at Durham supplies similar relics of foreign bishops, and the proportion of these broad-headed men is too great to be provided by the local mediæval population, which, though it doubtless contained individuals of the Bronze-age type, was yet, on the whole, characterised by a very large majority of individuals with distinctly narrow heads.

MR. W. MORFITT has been for some time engaged in the examination of a series of pit-dwellings accidentally discovered in the district of Holderness, in the East Riding of Yorkshire. Canon Greenwell and Mr. R. A. Gatty contribute an account of these discoveries to the June issue of *Man*. The people occupying this district, much of which, since their time, has been destroyed by encroachments of the sea, were evidently a very early Neolithic race, probably an early branch of that which introduced polished stone implements. Those which they possessed are almost Palæolithic in character. The fauna, however, which consisted of *Bos longifrons*, the horse, sheep or goat, hog, and red deer, is distinctly Neolithic. The only evidence of their acquaintance with the sea is the vertebra of a whale, which, on the analogy of the Guachos of the River Plate, Prof. Boyd Dawkins supposes to have been used as a seat.

THE Takelma language, one of the distinct linguistic stocks of America, is now nearly extinct, being spoken by only a few survivors of the tribe in the Siletz Reservation, western Oregon. It is therefore fortunate that Mr. E. Sapir, working under the direction of the American Bureau of Ethnology, has been able to secure the record of a con-

siderable body of their tribal mythology and folklore. This report, issued by the University of Pennsylvania, and forming part i., vol. ii., of their Anthropological Publications, is valuable from a linguistic point of view. The beliefs and mythology of the tribe exhibit curious resemblances and variances when compared with those of the neighbouring tribes, the explanation of which awaits further investigation.

To the June number of the *American Naturalist* Dr. R. L. Moodie contributes a note on the alimentary canal of a branchiosaurian salamander from the Carboniferous shales of Mazon Creek, Illinois, for which the new generic and specific name *Eumicrerpeton parvum* is proposed. The specimens, for there are two, are preserved in nodules, and were it not that soon after death the oesophagus became loosened and displaced, the viscera would recall those of a freshly dissected modern salamander. The author has compared the viscera with those of several genera of modern salamanders, and finds that they come nearest to those of an immature example of *Diemyctylus torosus* from Orcas Island, Puget Sound, the next nearest being *Desmognathus*, *Spelerpes*, and *Hemidactylus*. It is suggested that the adults of the three latter retain an ancestral condition of the intestine which is transient in *Diemyctylus*, and the author finds in the resemblance of the viscera of the fossil to the recent forms confirmation of his theory that modern salamanders are directly descended from the Branchiosauria.

In the same (June) issue of the *American Naturalist* Dr. J. Stafford gives a further account of his investigations on the early developmental history of the Canadian oyster, of which the first part was published in the journal cited for January, 1909. The author systematically employed plankton-nets in collecting the larvæ, which he claims to have been the first to recognise definitely in Canadian waters. He has also identified stages in development hitherto unobserved, including the young stages of the spat. He has defined the spatting period and the period during which the larva is free-swimming, while the developmental history has been followed up to adult stages. His results will, it is believed, be of importance in connection with commercial oyster-culture.

In a report on the giant moth-borer (*Castnia licus*), published at Georgetown, Demerara, Mr. J. J. Quelch directs attention in the strongest manner to the damage threatened to sugar-cane plantations, which form the staple industry of the colony, by the attacks of this insect. In spite of remedial measures, Enmore Plantation, where this insect inflicted so much damage in 1904 and 1905, is still suffering great loss, while Non Pareil Plantation is equally, if not more severely, affected. Some idea of the nature of the damage may be gleaned from the fact that the adult caterpillars are 3 inches in length and nearly $\frac{1}{2}$ inch in thickness, and that their growth is abnormally rapid. Concerted action on the part of plantation-owners is essential if the plague is to be stayed.

A LIST of the grasses of Alaska, prepared by Prof. F. Lamson-Scribner and Mr. E. D. Merrill, occupies vol. xiii., part iii., of the Contributions from the United States National Herbarium. Most of the material examined comes from the coast region, as very few botanists have ventured into the practically unknown regions of the interior, so that the present list may be regarded as a working basis for future collections. It is very remarkable that not a single species of the series *Panicaceæ* has been collected, while all the tribes except *Bambuseæ* of the other series *Poaceæ* are represented. *Poa* furnishes a number of species, while *Calamagrostis*, *Bromus*, and

Agropyron are well represented. The authors have provided analytical keys to the genera and species, as well as a short description for each item.

THE authentic list of new garden plants of the year 1909 has been issued as Appendix iii. to the current volume of the *Kew Bulletin*. The Orchidaceæ provides, as usual, more species and varieties than any other family, amongst them being *Cirrhopteratum longissimum*, a fine plant introduced from Siam; *Dendrobium Sanderae*, *D. acuminatum*, both from the Philippines; and *Megaclinium purpureorachis*, from the Congo. China supplies a fair quota of plants, notably *Primula Forrestii*, *P. Littoniana*, *P. Bulleyana*, and *Rhododendron Souliei*, besides sharing with Japan in the supply of species of *Juglans*. The genus *Salix* receives additions from Asia, while Mexico furnishes several species of *Mammillaria*. The Kew introductions include an *Encephalartos*, *Baikiaea insignis*, a leguminous evergreen tree, and *Strophanthus Preussii*, a climbing shrub, all from tropical Africa; also *Euphorbia Ledienii*, from South Africa. Six new species of the fern genus *Nephrolepis* and *Adiantum grossum* are noteworthy.

THE International Commission on Glaciers has just issued the fourteenth report upon "Les Variations périodiques des Glaciers," by Prof. E. Brückner and M. E. Muret (*Extrait des Annales de Glaciologie*, t. iv., March, 1910, pp. 161-76. Berlin: Borntraeger, 1910). This useful report, covering the year 1908, shows that the majority of glaciers under observation still continue to shrink, though the changes, as a rule, are not important. In the Swiss Alps fifty-three glaciers are probably or certainly decreasing, while fourteen are in the opposite condition. In the eastern Alps only one glacier shows some advance; in the others the general retreat continues. This it does, so far as observed, in the Italian and French Alps, but in the Pyrenees there is generally an increase, though not large. Of Norwegian glaciers thirty-five have been observed, and the table published ranges in most cases from 1904 to 1908 inclusive. In the latter year ten glaciers were growing and twenty-two shrinking. The author, Mr. P. A. Øyen, directs attention to the fact that in the central highlands the oscillation of the glaciers nearly corresponds with that of the climate, but in the western coast range it is rather retarded. In Sweden some advance is perceptible. The North American glaciers are oscillating, more especially in Alaska, and from Asia little precise information has been received. Evidently the ground which glaciers began to lose nearly half a century ago has not yet been recovered.

THE June number of the Journal of the Royal Geographical Society contains papers read before the society by Dr. T. G. Longstaff on glacier exploration in the eastern Karakorum, and by Prof. J. W. Gregory on the geographical factors that control the development of Australia. Dr. Longstaff achieved four important feats: the discovery of the Saltoro Pass; the fixing of the watershed in the eastern Karakorum; the discovery of the Siachen Glacier, the greatest glacier in Asia; the discovery of the peak "Teram Kangri," with an altitude of at least 27,500 feet, and possibly the highest mountain in the world. Prof. Gregory emphasises the isolation of Australia, the contrast between the marginal and the interior zones, and discusses the problem of the water-supply, the growth of population, and the question of the possibility of white colonisation in tropical countries such as North Australia.

IN one of the useful scientific papers contained in the report of the Prussian Meteorological Institute for 1909 Prof. Hellmann compares the results of the exposure of

thermometers in windows and in screens, such as are now generally used in this country, with the view of a future critical discussion of temperature conditions in Germany. The first part of the inquiry, contained in the report for 1908, showed that the introduction of the window screen about the year 1880, instead of the unprotected window exposure adopted at all stations prior to that date, did not interrupt the homogeneity of the observations. In the second part of the inquiry, experiments carried out at Potsdam as regards window exposure and exposure in "Stevenson screens," now used at about two-thirds of the German stations, show that not only the readings obtained by these two methods, but those at some of the more recent stations, are not strictly comparable. The differences are relatively small in coastal cloudy and windy weather, but considerably greater in dry and sunny inland districts. For details of this interesting discussion reference must be made to the tables and curves of the mean daily range shown for each month in the original paper.

EVERY month sees a fresh issue of the bulletins from the Bureau of Entomology of the United States Department of Agriculture. In Circular 119 Mr. Webster describes the clover root-borer (*Hylastinus obscurus*, Marsham), which has been introduced from Europe and become established in fields of red clover in the eastern States and elsewhere, causing considerable damage. The life-history has been investigated, but no method of extermination could be discovered. Mr. Ainslie deals with the large corn-stalk-borer (*Diatraea saccharalis*, Fab.). This insect burrows in the stalks of maize close to the ground, and so weakens them that they often break off in a strong wind. It was originally a sugar-cane pest, and came from the West Indies and from Central and South America, but for some time now has devoted its attention to maize.

THE presidential address delivered by Prof. M. C. Potter before the British Mycological Society has now been issued, and deals with bacteria in their relation to plant pathology. The subject has been much neglected both by bacteriologists and mycologists, in spite of the fact that at least ten plant diseases are considered to be caused by bacteria. They are pear-blight (*Bac. amylovorus*), yellow disease of hyacinth (*Pseudomonas hyacinthi*), canker of the olive (*Bac. oleae*), corn-blight (*B. zea*), potato wet-rot (*B. solaniperda*), soft rot of hyacinth (*B. hyacinthi-septicus*), bacteriosis of the vine (*B. uvae*), cucurbit wilt (*B. tracheiphilus*), brown rot of Cruciferæ (*Pseudomonas campestris*), and potato and tomato disease (*Bac. solanacearum*). A discussion of the problem is given and a bibliography is appended.

THE Chemical Society's Journal for May contains two papers by Mr. H. E. Watson on the molecular weights of helium, neon, krypton, and xenon. The neon was prepared in a state of exceptional purity by fractionating 40 litres of a mixture of helium and neon over charcoal at the temperature of liquid air, and full details are given of the methods used both in effecting the purification and in measuring the density of the gas; repeated determinations with various highly purified fractions gave values ranging from 0.8997 to 0.9006, the mean of eleven values being 0.9002. In the case of helium only two measurements were made, giving the values 0.17830 and 0.17814, mean 0.1782; as the gas which was weighed amounted only to 0.05 grain, the experimental error is placed at 1 part in 2000. Reduction of observed densities to zero pressure gave for the molecular weights of the gases of the series the values:—helium, 3.994; neon, 20.200; argon, 39.881; krypton, 82.92; xenon, 130.22.

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ALTHOUGH the use of oil as a means of securing more rapid dissipation of the heat generated in transformers has become almost universal in the case of large transformers, very little information has been available as to the relative merits of the various oil- and air-cooling devices. This information is now supplied in a paper by Mr. R. D. Gifford, of the University of Birmingham, which will be found in the May number of the Journal of the Institution of Electrical Engineers. His measurements show that if the cooling effect of the air in the case of a transformer be taken as unity, that of the free air would be about 1.1 and that of a strong air blast about 2. With oil cooling the effect rises to about 3, and if the oil itself is cooled by the passage of cold water through a worm immersed in the oil, the cooling effect becomes 6 or 7.

BULLETIN No. 40 of the Engineering Experimental Station of the University of Illinois consists of an account of measurements made by Messrs. J. K. Clement and C. M. Garland of the heat transmitted through a steel tube of $\frac{1}{4}$ -inch external diameter, with walls $\frac{1}{8}$ -inch thick, from steam outside to water inside running through the tube. The temperature of the outside surface of the tube was measured at two points by means of thermojunctions of copper-constantan placed in small holes drilled in the tube. The temperatures of the incoming and outgoing water and of the steam were determined by mercury thermometers. Curves are given showing the variation of the heat transmitted with the velocity of the stream of water and with the temperature of the steam, and the resistance to the transmission of heat is shown to be almost entirely concentrated in the films of stagnant steam and water in contact with the surfaces of the steel tube. The authors regard the present communication, not as one devoted to new facts, but as a demonstration of the utility of their method of measurement, and propose to apply the method to the investigation of problems connected with steam boilers. We should like to point out that a good deal of work has already been done in this direction both in this country and in others, and it is to be hoped that the new experiments will be directed to the solutions of problems which have not been already dealt with by Mr. Jordan or by one or other of the experimenters mentioned in Prof. Dalby's bibliography of the subject contained in the Journal of the Institution of Mechanical Engineers for last year.

WE learn from *Engineering* of June 24 that Lloyd's Register of British and Foreign Shipping is about to issue rules for internal-combustion engines for marine purposes. The rules are divided into four headings. The section concerning construction strongly enforces the importance of accessibility for examination and repair, and requires that engines of more than 60 brake-horse-power, which are not reversible, and are manoeuvred by clutch, must be fitted with a governor or other arrangement to prevent the racing of the engine when declutched. The cylinders are to be tested by hydraulic pressure to twice the working pressure to which they will be subjected; the water-jackets of the cylinders to 50 lb. per square inch, and the exhaust-pipes and silencers to 100 lb. per square inch. The tables are comprehensive, embracing smooth-water and open-sea service boats, and engines of 4-stroke cycle and 2-stroke cycle. Separate fuel-tanks are to be tested, with all fittings, to a head of at least 15 feet of water. Oil-fuel pipes are to be of annealed seamless copper, with flexible bends, conical joints metal to metal, with a cock or valve at each end of the pipe conveying the fuel from the tank to the carburettor or vaporiser. The machinery is to be submitted for survey annually, and practically all parts are to be examined, the fuel-

tanks and all connections being, if deemed necessary by the surveyor, tested to the same pressure as when new. The screw-shaft is to be drawn at intervals of not more than two years.

In directing attention to the diversity of published results of compressive tests on cubes of concrete, the *Builder* for June 18 suggests that the explanation is to be found in the different methods and different pressures used in ramming the concrete into the test moulds. We may add to this explanation the fact that variation in the water used in mixing the concrete under test is a most important factor, influencing both the ramming pressure required and also the strength of the resulting specimen. Our contemporary suggests that an appliance such as is used in the Charlottenburg laboratory might be adopted in this country. In this appliance a ram is lifted by gearing and released by a cam, the arrangement being such that the ram always falls from the same height. After each blow the ram is automatically moved for a short distance in a direction parallel to the axis of the actuating wheel, while the mould is moved perpendicularly to the same axis. The effect is to ensure uniform ramming of the whole. It is stated that the experience at Charlottenburg shows the resistance of test blocks so prepared to be very uniform for concrete of given composition.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES IN JULY:—

July 12. 14h. 11m. Jupiter in conjunction with the Moon (Jupiter $2^{\circ} 58' S.$).
 15. Mercury. Illuminated portion of disc = $0^{\circ} 978$, Venus = $0^{\circ} 813$.
 16. 10h. 39m. Minimum of Algol (β Persei).
 19. Saturn. Major axis of outer ring = $39^{\circ} 96'$, minor axis = $12^{\circ} 35'$.
 21. 9h. 6m. Uranus in conjunction with Moon (Uranus $3^{\circ} 44' N.$).
 27. 6h. 29m. to 9h. 9m. Transit of Jupiter's Sat. III. (Ganymede).
 27-31. Meteors abundant from Perseus and Aquarius.

HALLEY'S COMET.—A number of observations, generally confirmatory of those already noted in these columns, are recorded in No. 4421 of the *Astronomische Nachrichten*. Dr. Wolf gives a sketch of the tail showing its position, with regard to the surrounding stars, and its form as shown on a photograph taken on May 12 at 14h. 15m., Königstuhl M.T. This shows that a straight, narrow tail extended from the head to just south of 70 Pegasi, and from there to the end was bounded by two faint clouds of cometary matter, too faint to be seen visually. The outline of the northern cloud was very irregular, and departed considerably from that of the visual tail, and in any discussion as to whether the earth passed through any mass of cometary material these abnormal extensions must be taken into consideration.

Prof. Seeliger reports that, at Munich, careful observations failed to reveal any trace of the comet's head or nucleus during its passage across the solar disc, nor were any magnetic or electrical phenomena recorded which could be, with certainty, attributed to the comet. So many observers report the non-detection of the nucleus that it must now be taken as fairly certain that the material of which the head and nucleus are composed is too tenuous to interfere, effectively, with the passage of light.

M. Eginitis gives further details as to observations at Athens Observatory, and directs special attention to the peculiar shape presented by the comet on the evening of May 20. The appearance was very similar to that of a crescent moon, with a very bright condensation at the centre of the convex arc, and no extended tail was seen; such a form might be explained by assuming that the axis of the tail was nearly in the line of sight. This would also explain the apparent anomaly of the slight tail being turned towards the sun if one supposes that the curvature

was sufficiently great; in this case, the passage of the earth through that part of the tail extending to its orbit would have been delayed some forty to sixty hours, and it appears to be probable, if these observations of May 20 are verified, that a passage did actually take place.

M. Comas Sola gives drawings showing the definite duplication of the nucleus on June 2, and the appearance of four or five separate condensations, *globes*, on June 4.

In an interesting communication to the *Comptes rendus* (No. 26, June 27, p. 1732), M. Nordmann discusses the amount and the nature of the light emitted by the comet, as observed with his colour-screen photometer. He finds that on three dates of observation, April 25, May 15 and 23, the nucleus contributed only about one thirty-seventh of the total light emitted by the head. By comparing his values with the observed diameters of the nucleus and coma, respectively, he deduces that towards May 15 the mean intrinsic light of the nucleus was about nineteen times that of the visible part of the coma. Taking the theoretical increase of light of a comet as varying in the ratio $1/r^2 \Delta^2$, and comparing his observed with the calculated values, M. Nordmann finds that between April 25 and May 23 the augmentation of the brilliancy of the nucleus was much less than provided for by the theory. Finally, by the employment of his colour-screen method, M. Nordmann found that the distribution of energy in the spectrum of the nucleus was very similar to the distribution in the solar spectrum, and hence he concludes that the light of the nucleus is almost exclusively, if not entirely, reflected sunlight.

Mr. Leach, Malta, reports that, after finding the comet so faintly distinguishable on June 14, he gave up all hope of seeing it again. On June 25, however, he saw it quite clearly at 9 p.m., and was able to follow it each evening until the day of writing, June 30; with field-glasses, a tail 2° or 3° in length was clearly visible.

EPHEMERIS FOR COMET 1910a.—In No. 4422 of the *Astronomische Nachrichten* Prof. Kobold gives a continuation of his ephemeris for comet 1910a. The position is changing very slowly, and for July 7 is 21h. 40.5m., $+33^{\circ} 21' 4''$; an observation by Prof. Barnard on June 7 gave a correction of $+7s.$, $+1.6'$, and showed the magnitude to be about 16.0.

PHOTOGRAPHS OF MOREHOUSE'S COMET.—From the Tokio Observatory we have received part vi., vol. iii., of the *Annales*, in which are reproduced nearly fifty excellent photographs of Morehouse's comet, 1908c. Messrs. Hirayama and Toda briefly describe the separate photographs, and discuss the remarkable changes which took place in the comet's tail. By comparing their results with those obtained at the Yerkes and Heidelberg Observatories, they find that between October 1 and 2 a recognised detached mass, at a mean distance of 24° from the head, was receding at an hourly rate of $8.5'$; other values are:—October 15, 1° from head, northern mass $3.1'$, southern mass $3.4'$, per hour; October 15-16, 14° from head, $3.1'$ per hour. As is pointed out, the accumulation of such data will serve to determine the nature of the repulsive force. A discussion of the photographs also discloses that on November 13, 14, 15, and 16, the outer streamers of the tail appeared to change in phase, predominating southwards on November 13 and 15, and northwards on November 14 and 16. This might be ascribed to a rotation of the head, with a period of forty-eight hours, but further discussion is necessary to establish this; in any case, the photographs show that if such a rotation existed it was not uniform throughout the tail, for the outer and inner streamers did not rotate with the same angular velocity.

THE DETERMINATION OF POSITION NEAR THE POLES.—As an excerpt from the *Geographical Journal* for March, we have received a copy of a paper by Mr. Hinks dealing with the methods of determining an observer's position when near the poles. Mr. Hinks suggests that a theodolite, say a 3-inch, read on both faces, would prove the most suitable instrument, and then proposes a modification of Sumner's method for the reduction of the observations. Two observations of the sun at two different known G.M.T.'s give two circles of equal altitude which intersect at the observer's position; a simple graphical method may be used for the reduction. A most interesting discussion, by well-known explorers, followed the reading of